

# SOUTH DAKOTA

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Statewide Communications System

# Before the System

1940's to 2003:

- Statewide lowband system (39MHz). Dispatch to car communications primary, car to car limited to 10 miles or less 70-75% coverage, very prone to interference, limited equipment availability.
- DOT highband system (150MHz). System used by DOT only, 22 sites, dispatch to car, car to car over coverage of a single site. 75-80% coverage.
- Forestry highband system (150MHz). Dispatch to car, car to car over coverage of a single site. Black Hills area only.
- Deployable UHF (450MHz) and VHF (150MHz) system for interoperability during events and disasters.
- Local agencies began migrating off of lowband in 1960's and 1970's because system no longer met their needs. Agencies operated on UHF and VHF without any coordination. State/local/federal/tribal communications were problematic at best, and in many cases no radio communications existed between the groups.

# The Tipping Point, Spencer Tornado



1998

- Davison County Units 450MHz radios
- DOT & adjacent County units 150MHz radios
- Highway Patrol 39MHz radios

## Result?

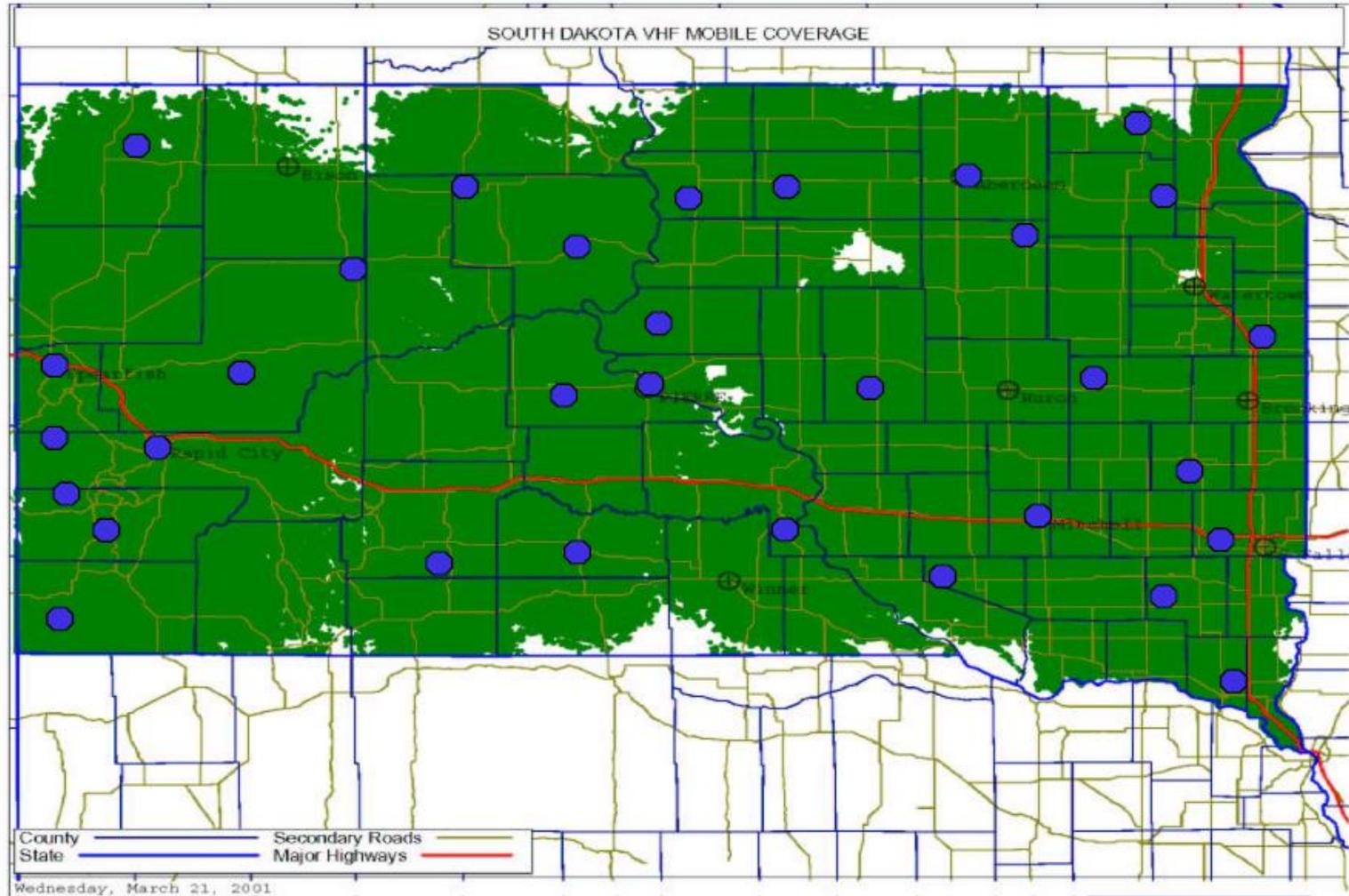
No coordinated communications. Governor Janklow ordered a deployable system in and handed out radios. This is the lowest level of emergency interoperability as currently defined by DHS.

# Decision to Upgrade

- Legislative action in 1999. HB1292 directed the 8 state agencies using radio communications to integrate into a common system, initial scope was expanded by the Governor to include local agencies.
- 1999 to 2000 decision process.
- 2000 to 2002, system design, built master site & first 5 sites for testing.
- 2002-2003, finish buildout of initial 35 sites.

System was designed to provide the maximum area coverage with the minimum of sites. Vendor claims that we are still the only entity to request a budget-based system, as opposed to an objectives-based system.

# Original 35 Sites



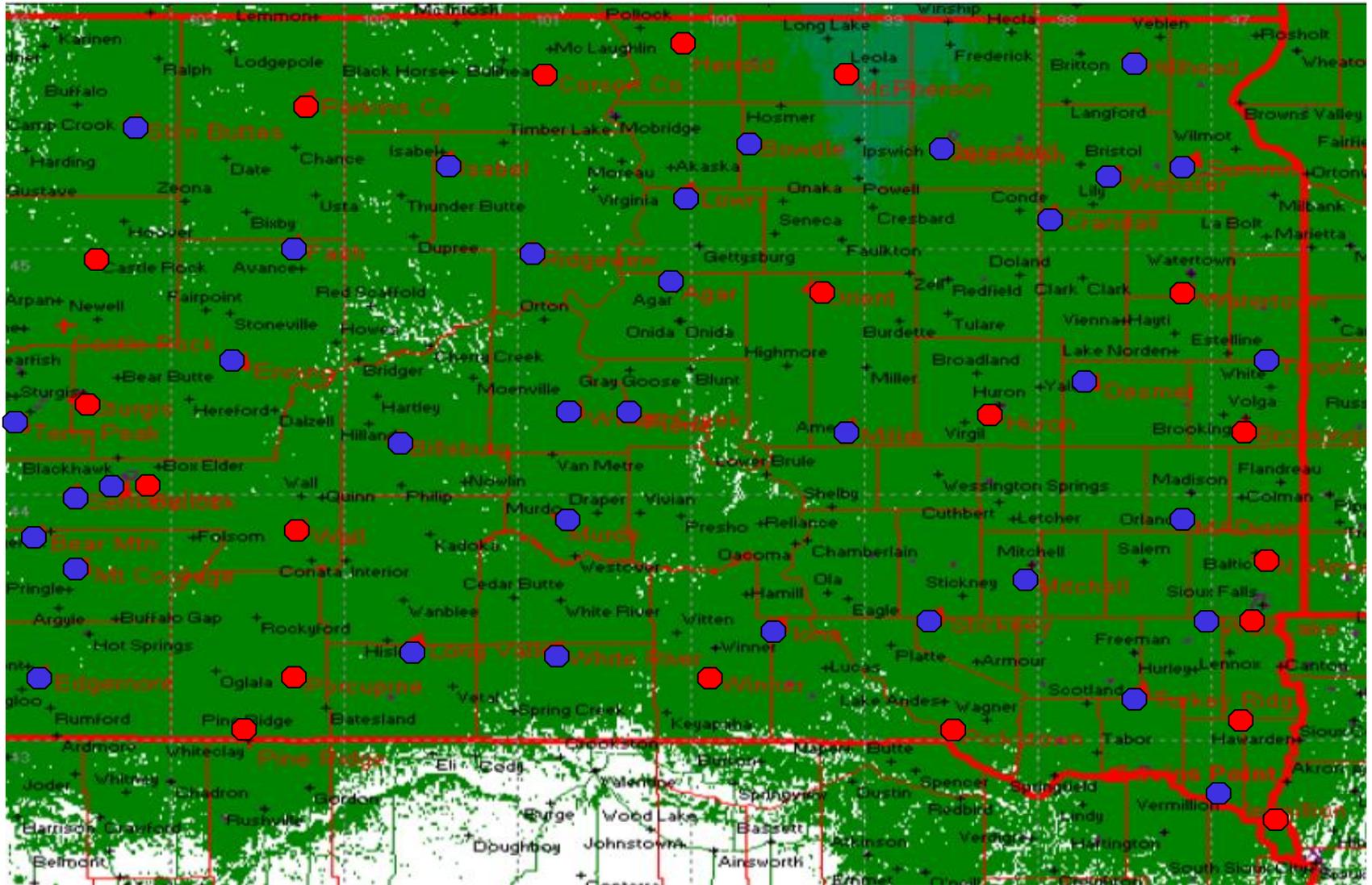
# Continue to Expand

- 2003-2004, Corson, Charles Mix, Baltic, Perkins County(DHS Funds), SF Simulcast (3 sites, local funds), Watertown, Brookings, Huron, Yankton (CDBG funds)
- 2005-2007, Wall, Winner, Butte County, Beresford, Herreid, Orient, Sturgis (DHS funds).
- 2008-2013, Porcupine and Pine Ridge (BIA funds), RC Simulcast (2 sites, local funds)
- 2014 McPherson County, (Local/DHS/SRC project)
- 2018\* Union County Site, (appropriation)

## **Sites Relocated for Better Service**

- Murdo, from I-90 site in Murdo to site north of town, much higher elevation
- Yankton County site from Gayville to Federal tower across river from Yankton
- Pierre, from old DCI building to Mickelson building, much higher elevation

# State Radio Sites



● Original 35 sites, 85% geographic coverage

● Additional 23 sites, appx. 98% geographic coverage.

# Factors Affecting Coverage

- Topography -- Radio waves do not sharply bend around hills or valleys.
- Site – equipment issues, antenna connections.
- Radio type -- Portable 5 watts, mobile radio 45 watts + external antenna.
- Subscriber condition – big factor. We manage around 20% of radios on the system. Condition/programming of radio, and antenna condition have a major impact on interaction with system. We cannot control that element.

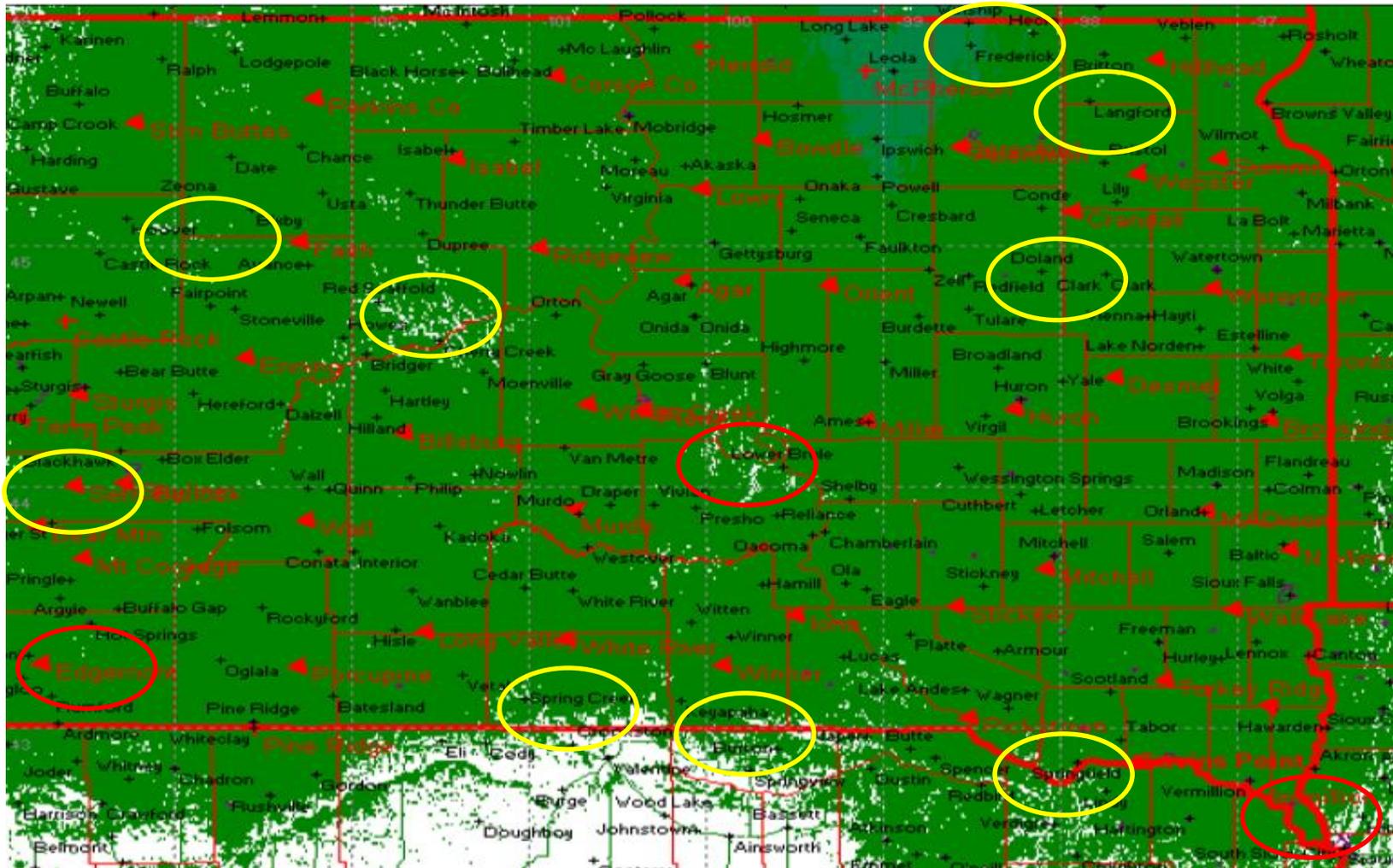
# Factors Affecting Further Buildout

- DHS grant funds are 1/10<sup>th</sup> of what they were at peak, primary funding source
- 2012-2014 major upgrades required to Master Site, Dispatch sites, and site equipment to keep equipment in support. This fully involved staff.
- 2012-2014 upgrades require an additional \$200k in support because of the move to an IP-based system. We now have the same software updates and security requirements associated with data networks.
- Coverage area investment. The McPherson County site turned up in 2014 covers approximately 1200 sq. miles, the site in Union County will cover approximately 200 sq. miles. Outside of tower, site costs are the same

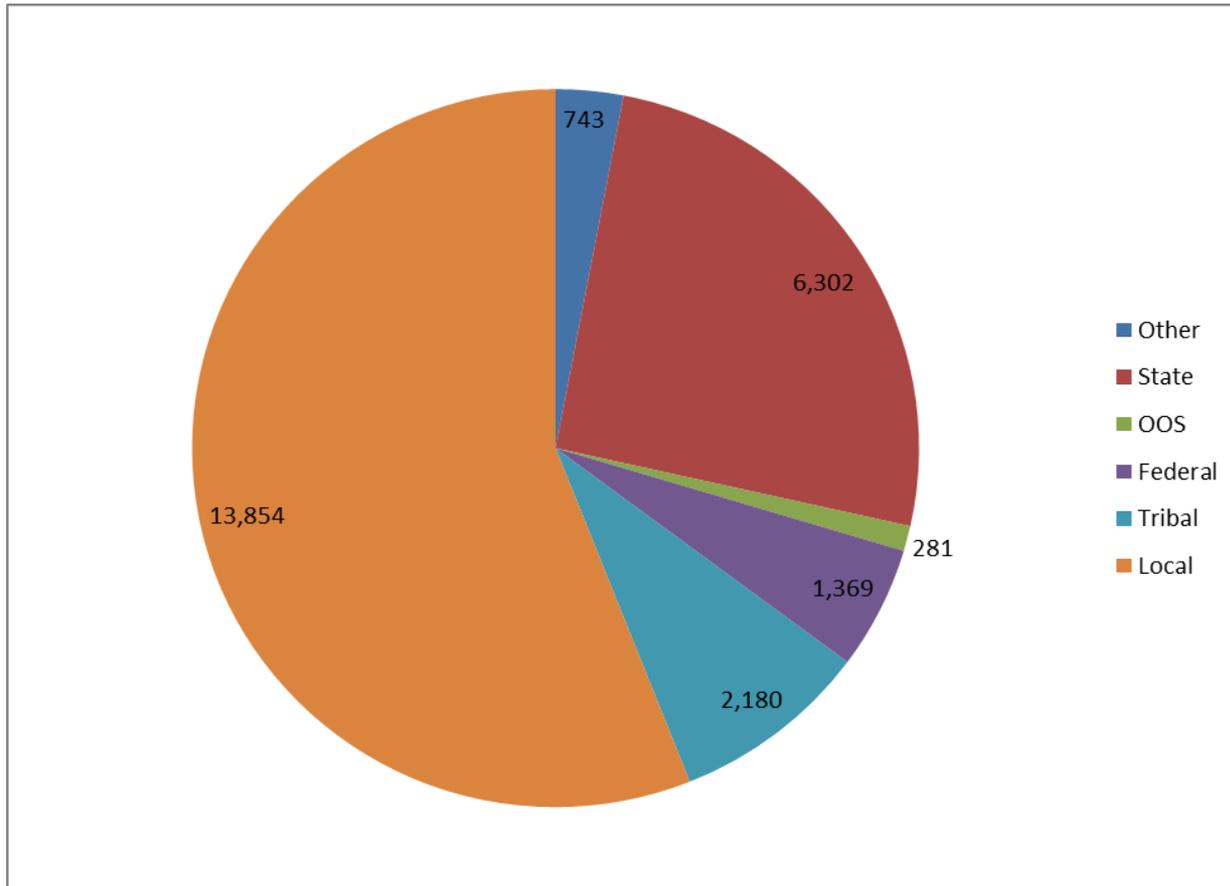
# SDPSCC Designated Priority Sites

1. Union County – Southern end of Union County <200 Sq. miles. HIDTA route, I-29, lots of commuter traffic.
  - Have tower in place, equipment quote, frequency study completed, site will take about \$300k to finish.
2. Northern Lyman County. Area north of I90 underserved. Have Reliance SDPB tower in place. Est. \$300k to install.
3. Fall River County. Very problematic areas along Hwy 18. We have Battle Mountain tower in place. Est. \$300k to install.

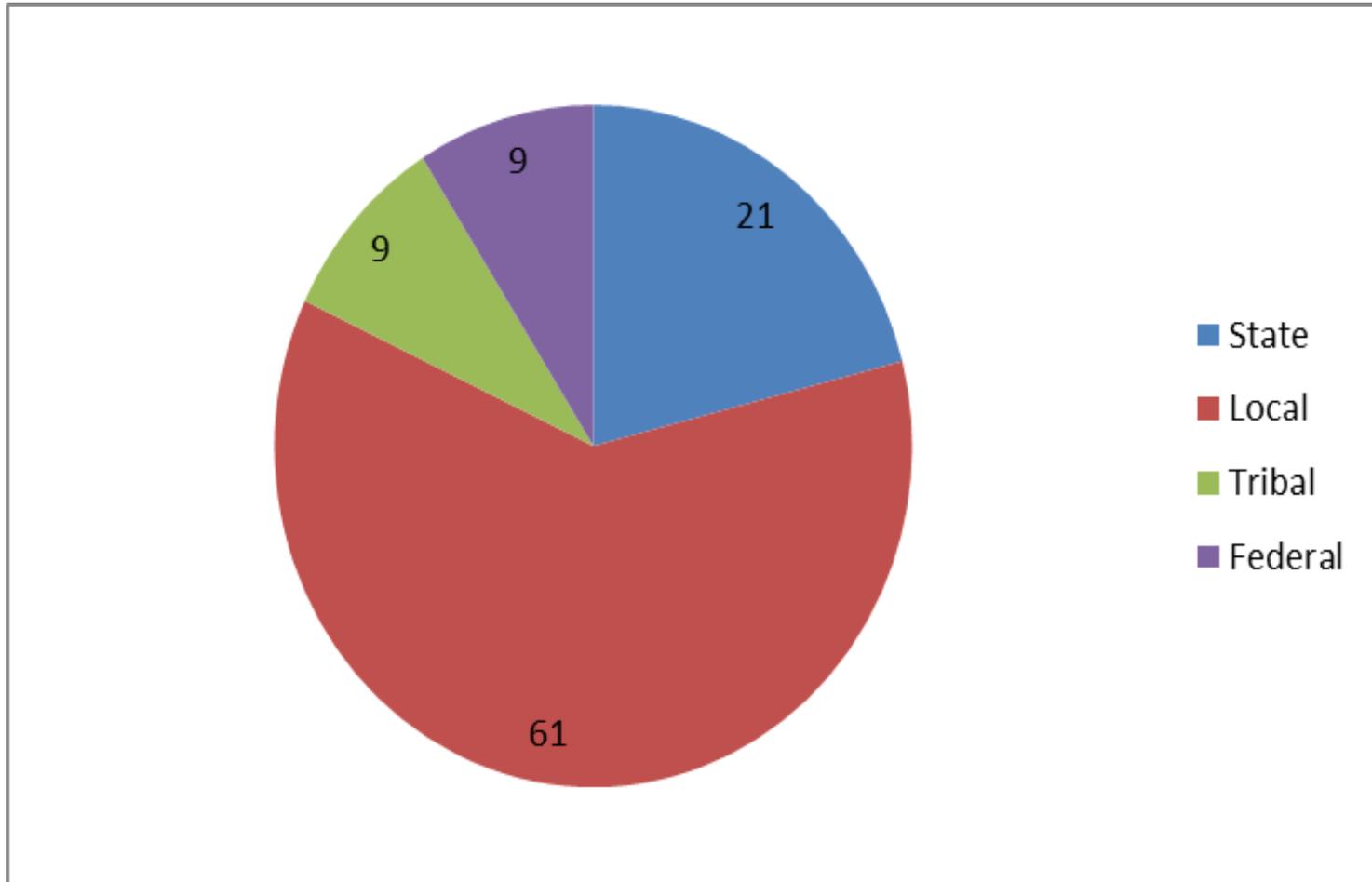
# Priority and Identified Underserved Areas



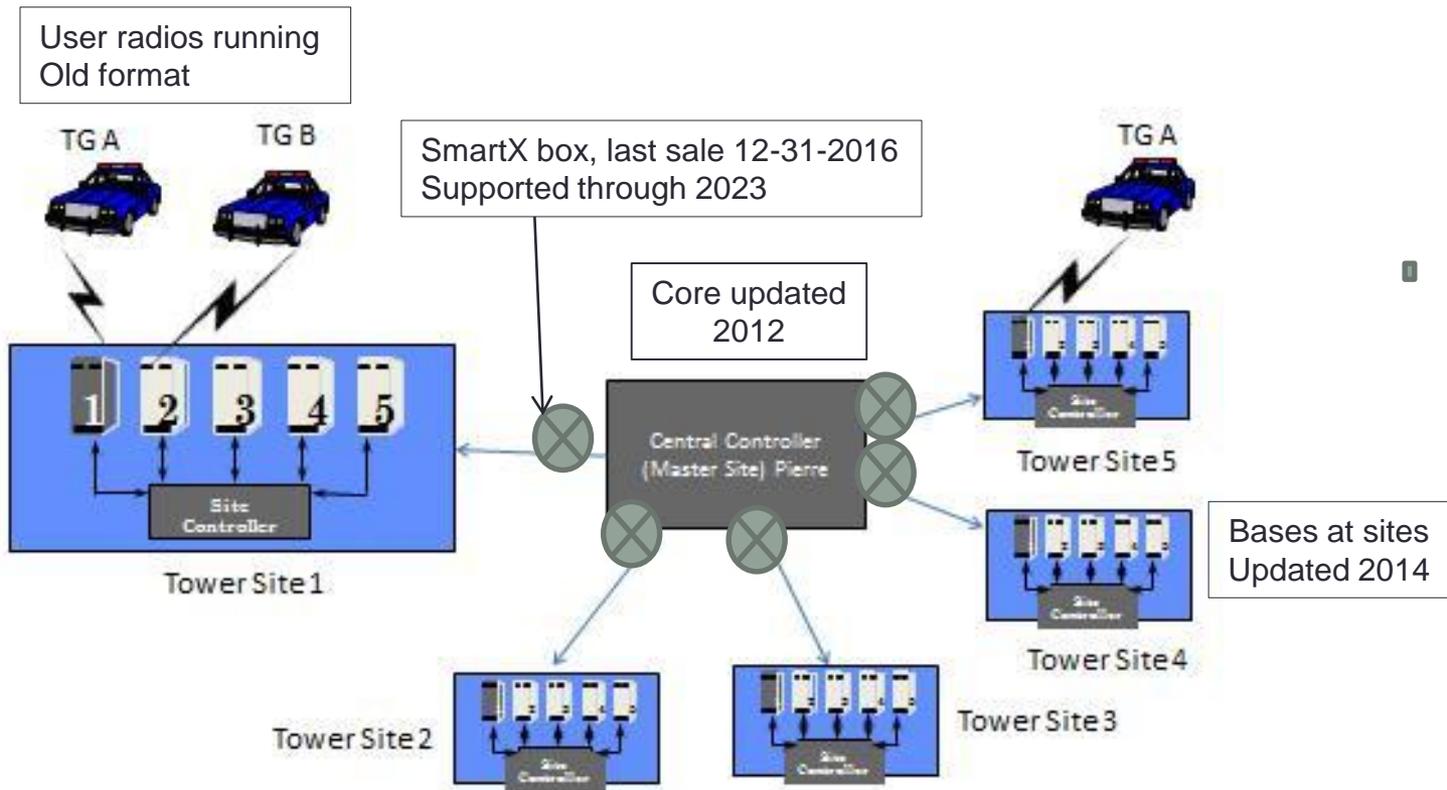
# Radio ID Distribution Breakout



# Major Users % on Network



# Radio Network Operating System



# Radio Network Operating System (Project 25)

- Project 25 (P25) was developed in 1989 by a coordinated effort by 6 national communications associations and federal agencies to address a lack of system interoperability between vendors equipment.
- The P25 standard is under constant review, type acceptance process, and has multiple vendors building product that is compatible. This is and will continue to be the national standard for public safety comms.
- P25 has two separate components: digital voice, and networking.
- When the South Dakota system process was started in 1999, P25 networking standards for the VHF spectrum had not been developed. A hybrid system of P25 voice and a Motorola proprietary networking was installed.

# Lifecycle Guidance Provided By Vendor

March 14, 2013

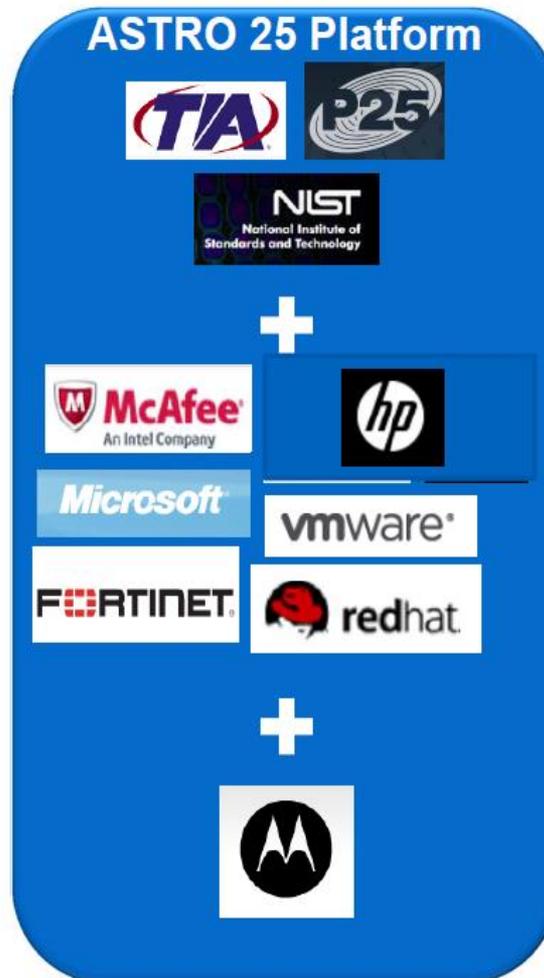
- Update network controller to P25 (Completed 2012)
- Update Quantar repeaters at sites (Completed 2014)

Operating System will be supportable through 2025

March 10, 2016

- Majority of subscriber radios on the system if not upgraded by the end of 2017 to P25 will not have support offered thereafter and would need to be replaced.
- End of support for protocol adaptors allowing mix-mode operation, 12-31-2023. Any failure beyond current spare parts would result in sites being down.

# IP Radio Soup – Hardware, Software, Security



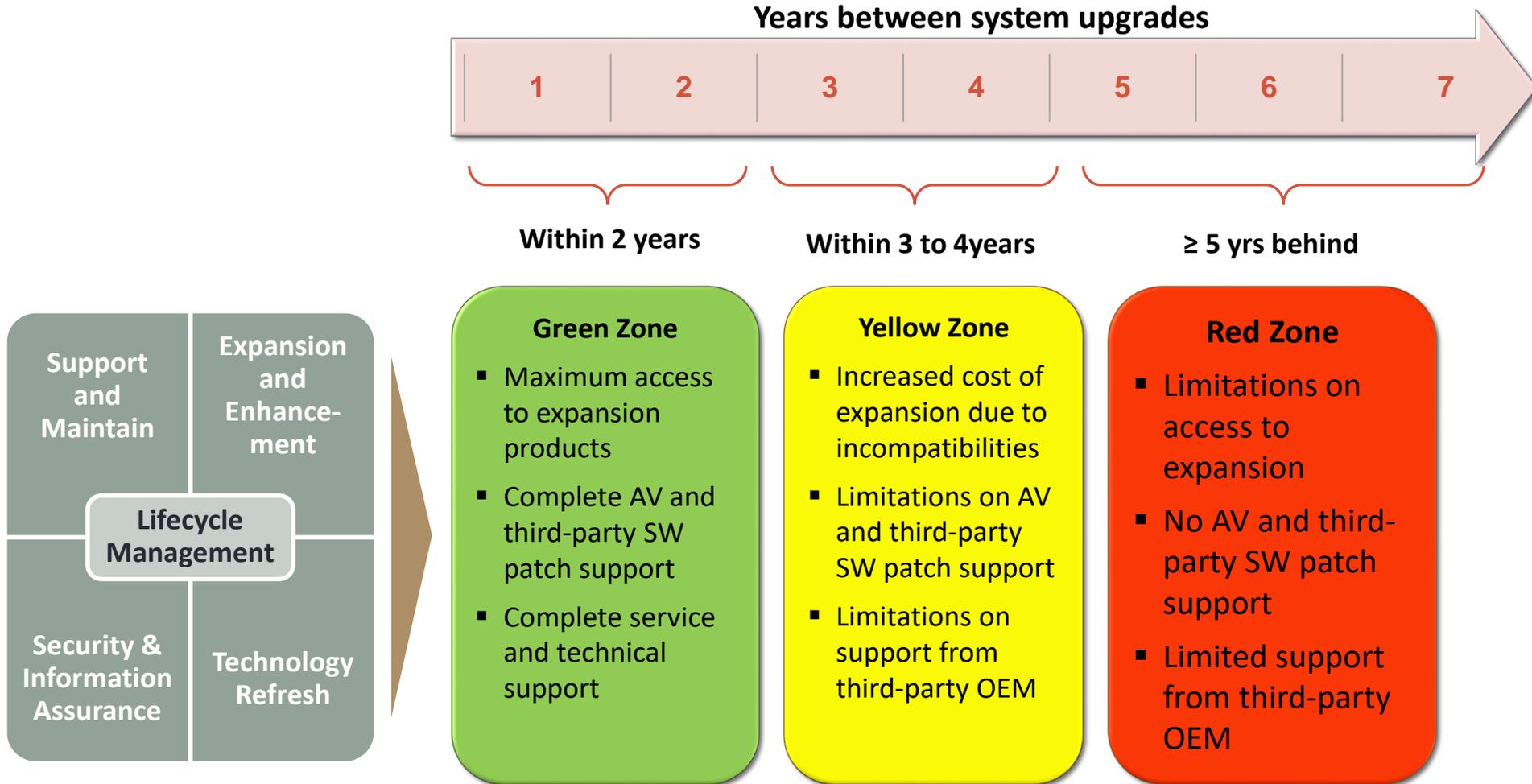
# All System Components Have A Life Expectancy

## SMARTZONE STATION MIGRATION via SMARTX LIFECYCLE

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Quantar Base station (1992)		◆ Last Quantar shipments 12/31/2011					◆ Last Quantar release support 7.17		◆ End Quantar parts support 12/31/2018		◆ End Quantar depot repair 12/31/2020	
MTC 3600 SmartZone Prime & ReSC (2001)				◆ Last MTC 3600 shipments 12/31/2013			◆ Last MTC 3600 release support 7.17				◆ End MTC 3600 P/S & depot repair 12/31/2020	◆
3600 GTR 8000 Base Station w/ SmartX (2013)			◆ Start 3600 GTR 8000 w/ SmartX shipments 3Q13				◆ Last 3600 GTR release support 7.17				◆ Last 3600 GTR 8000 Shipments** 12/31/2020	
PSC 9600 Site Controller (2003)					◆ Last PSC 9600 shipments 12/31/2014		◆ Last PSC 9600 release support 7.17					◆ End PSC 9600 P/S & depot repair 12/31/2021
Quantar P25 Upgrade Kit					◆ Last Qntr P25 Kit shipments 12/31/2014		◆ Last Qntr P25 Kit release support 7.17				◆ End Qntr P/S & depot repair 12/31/2020	◆
P25 Operation				Upgrade to P25 FDMA or TDMA Operation								☺ → P25 Operation 2020 & beyond

\* This information is intended for planning & budgeting purposes only

# Lifecycle planning must take into consideration the trade-offs associated with elapsed-time between system updates



**As time elapses between upgrades:**

- **Decreasing level of serviceability and supportability**
- **Increasing costs to implement new features or expand system**

# Current Options

## **Option 1, Support the Current System**

1. Determine funding plan
2. Upgrade radios on system by 2023
3. Upgrade system to full P25 starting in July 2023

## **Option 2, Let Current System Run its Course**

1. System may run until 2023 or it may run until 2030
2. Any major network equipment failure will shut down site(s) or system
3. Augment with FirstNet ePTT or other cellular push to talk
4. Redefine emergency response comms, focus on local communications

# Miscellaneous

- We have approximately 20,000 radios on system, 60% local, 21% state, and tribal/federal 18%.
- Estimated investment in infrastructure to date is around \$65m. Because of how we built the system and utilized much of our own technical resources our system is less than a third of the investment made by other states building similar systems.
- System is maintained by BIT/State Radio, and through planning with Motorola over the past 6 years we have invested around \$13m to upgrade components of the system that will allow us to move from a proprietary system to a national standard system.